

Cloud, Precipitation and Radiation over the Tibetan Plateau and its Neighboring Areas

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By using CloudSat/CALIPSO and TRMM data, the characteristics of cloud vertical structure over the Tibetan Plateau (TP), its southern adjacent land (southern region) and the tropical region are comparatively analyzed. The cloud vertical structure over the TP and its southern region shows significant seasonal variation. In the TP, the cloud amount presents a single peak in January-April, while two peaks after mid-June, and resumes one peak after mid-August. In the southern region, the cloud occurs rarely from October to April, and the cloud amount is mostly below 4% ; while from May to September, the cloud is located at 10-17.5 km and the amount are more than 44%, which is the largest among the three regions. In the tropical region, the cloud is located stably through whole year. Due to the TP restrictions on moisture supply in lower level, there is a significant compression of cloud thickness, cloud layers, as well as cloud top height, so the possible precipitation intensity is smaller over the TP than the other two regions. The variation range of cloud thickness, cloud layers number and cloud top height corresponding to different precipitation intensity is significantly smaller over the TP than the other two regions. In summer, deep convection cloud, which can reach 12-16 km altitude, is significantly smaller over the TP than the other two regions, while the relatively shallow cloud, located in 5-8 km and corresponding to mixed phase cloud water content, appears much more than the other two regions. These significant differences of cloud microphysical characteristics over the TP and other regions may have impacts on the radiation and precipitation. Our results can be applied on the improvements of model simulation on the cloud characteristics and precipitation.

Keywords: Cloud, Precipitation, Radiation, the Tibetan Plateau

Pentad cloud amount, unit: %

